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U S NAVAL PROVING GROUND
DAHLGREN, VIRGINIA

REPORT NO 1139

PRACTICE BOMBS AND ASSOCIATED COMPONENTS

5th Partial Report

CATAPULT AND ARRESTED LANDING TEST OF PRACTICE BOMB 1000 POUND, TYPE EX 16 MOD 0

FINAL Report

Copy No. 10

Task Assignment NPG-Re3c-238-1-53

Classification CONFIDENTIAL SECURITY INFORMATION

Catapult and Arrested Landing Test of
Practice Bomb 1000 pound, Type Ex 16 Mod 0

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PART A

SYNOPSIS

1. This is the final report on the catapult and arrested landing tests of the 1000 pound practice bomb type Ex 16 Mod 0. The purpose of the test was to determine the following:

a. Deformations occurring from catapult and arrested landing tests under a 6.0 g load fore and aft and a 3.0 g side load.

b. Ability of the spotting charge, consisting of a Mk 4 Mod 3 signal and Mk 1 Mod 0 firing pin, to withstand catapulting and arrested landings without firing, under a 6.0 g load fore and aft and a 3.0 g side load.

c. Deformations occurring from a bomb ejector test.

d. Maximum g load that may be obtained without evidencing permanent deformation or causing the signal to function.

2. At 6.4 g's acceleration and deceleration parallel to the fore and aft axis of the bomb, there was no deformation and no indication of unsafe condition of the signal. At a 3.3 g side load the bomb was slightly dented in the sway brace area, not considered a serious deformation, and the signal remained safe. At 8.8 g's acceleration parallel to the fore and aft axis, there was no deformation of the bomb, but the firing pin of the signal was set back one-quarter (1/4) inch. Acceleration was increased to 12.6 g's with no further adverse results; however, at 12.6 g's, the safety pin was inadvertently left in the signal. Deceleration along the fore and aft axis was increased to 12.6 g's with no signal failure and no deformation. Side loads were increased over four (4) more shots to a maximum of 11.7 g's with progressive increase of denting of the bomb in the sway brace area. The dents in the forward sway brace area cover about thirty (30) square inches each and are approximately one (1) inch deep. The dents in the rear sway brace area cover about twelve (12) square inches each and are approximately one-half (1/2) inch deep. The bomb was fired from a Douglas Bomb Ejector using a Mk 1 cartridge with no resultant damage.

Catapult and Arrested Landing Test of
Practice Bomb 1000 pound, Type Ex 16 Mod 0

3. It is concluded that the 1000 pound practice bomb type Ex 16 Mod 1 satisfactorily meets acceleration and deceleration requirements with the load imposed parallel to the fore and aft axis. It also meets strength requirements under a 3 g side load, but will not absorb side loads appreciably higher than 3 g's without some deformation. It can be satisfactorily fired from the Douglas Bomb Ejector without damage to the bomb.

Catapult and Arrested Landing Test of
Practice Bomb 1000 pound, Type Ex 16 Mod 0

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PART B

INTRODUCTION

1. AUTHORITY:

This test was authorized and conducted in accordance with reference (a) under Task Assignment NPG-Re3c-338-1-53, established by reference (b).

2. REFERENCES:

a. BUORD Conf ltr Re3c-RFG:gg Serial 48619 of 4 Dec 1952
b. BUORD Conf ltr NP9-Re3c-BEK:mp Serial 43203 of 6 Aug 1952

3. BACKGROUND:

The 1000 pound Practice Bomb Ex 16 Mod 0 is a water-sand fillable practice bomb whose external shape duplicates the 1000 pound low drag general purpose bomb. It is a monolithic design with internal bracing to strengthen the sway brace area and fins. The bomb has provisions for installation of a spotting charge using a Mk 4 Mod 3 signal and Mk 1 Mod 0 firing pin, and for external installation of two M-23 and two M-16 igniters for use as a fire bomb.

4. OBJECT OF TEST:

The object of the test was to determine the following:

a. Deformations occurring from catapult and arrested landing tests under a 6.0 g load fore and aft and a 3.0 g side load.

b. Ability of the spotting charge, consisting of a Mk 4 Mod 3 signal and Mk 1 Mod 0 firing pin, to withstand catapulting and arrested landings without firing, under a 6.0 g load fore and aft and a 3.0 g side load.

c. Deformations occurring from a bomb ejector test.

d. Maximum g load that may be obtained without evidencing permanent deformation or causing the signal to function.

Catapult and Arrested Landing Test of
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5. PERIOD OF TEST:

a.	Date of Project Letter	4 December 1952
b.	Date Material Received	20 February 1953
c.	Date Commenced Test	2 March 1953
d.	Date Test Completed	3 March 1953

PART C

DETAILS OF TEST

6. DESCRIPTION OF ITEM UNDER TEST:

The 1000 pound practice bomb Ex 16 Mod 0 is a water-sand fillable practice bomb whose external shape duplicates the 1000 pound low drag general purpose bomb. It is a monolithic design with internal bracing to strengthen the sway brace area and fins. The bomb has provisions for installation of a spotting charge using a Mk 4 Mod 3 signal and Mk 1 Mod 0 firing pin, and for external installation of two M-23 or two M-16 igniters for use as a fire bomb. The bomb was loaded with sand and water to a total weight of 745 pounds. Seven (7) shots were fired with two (2) M-23 igniters installed externally and six (6) shots were fired with two (2) M-16 igniters installed externally. The Mk 4 Mod 3 signal with a Mk 1 Mod 0 firing pin was installed in the tail of each bomb on all shots.

7. DESCRIPTION OF TEST EQUIPMENT:

The acceleration and deceleration tests were conducted on the catapult and arrested landing facility of the Laboratory Services Division of the Aviation Ordnance Department. This consists of a car traveling on a track launched by a catapult type P, Mk 6 Mod 1, and stopped by an arresting gear unit Mk 4. The ejector test was performed using a Mk 1 cartridge in a standard Douglas Bomb Ejector. The ejector was mounted in a rigid test tower so that the longitudinal axis of the bomb was vertical with the nose down.

8. PROCEDURE:

The bomb was filled with sand and water and the spotting charge and external igniters installed. The bomb was mounted on the catapult car and accelerated with the longitudinal axis parallel to the motion of the car for the fore and aft loads and perpendicular to the motion of the car for the side loads. The catapult was operated in the normal manner to produce required accelerations. The bomb itself, the signal and the igniters were inspected after each shot. Appendix (A) is a tabulation of accelerations to which the bomb was subjected. Appendix (B) consists of photographs taken before and after the test. For the ejector test, a Mk 1 bomb ejector cartridge was used in a standard Douglas Bomb Ejector, with the bomb mounted vertically, nose downward.

9. RESULTS AND DISCUSSION:

a. Throughout the test there was no damage to or failure of the Mk 4 Mod 4 signal, the M-16 or M-23 igniters.

b. On the fourth shot at 8.8 g's, with the longitudinal axis parallel to the motion of the car with the nose forward, the Mk 1 Mod 0 firing pin was set back one-quarter (1/4) inch.

c. A side load acceleration of 3.3 g's produced only slight denting of the bomb in the sway brace area.

d. Accelerations and decelerations up to 12.6 g's in a fore and aft direction produced no damage to the bomb.

e. Side loads up to 11.7 g's resulted in further denting of the bomb in the sway brace area. After a total of five (5) side load shots, the forward dented area covered about thirty (30) square inches each to a depth of approximately one (1) inch. The after dented areas covered about twelve (12) square inches each to a depth of approximately one-half (1/2) inch. This damage is shown in Appendix (B) (Figures 3, 4 and 5). In view of the loads imposed, the damage is not considered excessive.

f. The bomb was fired from the Douglas Bomb Ejector with no damage to any component part of the bomb.

Catapult and Arrested Landing Test of
Practice Bomb 1000 pound, Type Ex 16 Mod 0

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PART D

CONCLUSIONS

10. It is concluded that the 1000 pound practice bomb type Ex 16 Mod 0 satisfactorily passed all tests required by reference (a). However, the bomb will not withstand side loads in excess of 3 g's without some deformation.

PART E

DISPOSITION OF MATERIAL

11. The 1000 pound practice bomb type Ex 16 Mod 0 used in the catapult and arrested landing tests is being retained in the Aviation Ordnance Department awaiting disposition instructions.

Catapult and Arrested Landing Test of
Practice Bomb 1000 pound, Type Ex 16 Mod 0

The tests upon which this report is based were conducted by:
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NPG REPORT NO. 1139

U. S. NAVAL PROVING GROUND
DAHLGREN, VIRGINIA

Fifth Partial Report

on

Practice Bombs and Associated Components

- -

Final Report

on

Catapult and Arrested Landing Test of

Practice Bomb 1000 pound, Type Ex 16 Mod 0

Project No.: NPG-Re3c-308-1-53
Copy No.: 10
No. of Pages: 8

Date: JUN 9 1953

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SECURITY INFORMATION

Catapult and Arrested Landing Test of
Practice Bomb 1000 pound, Type Ex 16 Mod 0

TABLE I

Tabulated Test Data

Date 1953	Description	Acceleration-"G"	Remarks
3-2	Side	3.3	Slight denting in sway brace area.
3-2	Nose Forward	6.4	No damage.
3-2	Tail Forward	6.4	No damage.
3-3	Nose Forward	8.8	Firing pin set back 1/4 inch.
3-3	Nose Forward	10.6	No damage.
3-3	Nose Forward	12.6	No damage. Safety pin left in inadvertently.
3-3	Tail Forward	8.8	No damage.
3-3	Tail Forward	10.6	No damage.
3-3	Tail Forward	12.6	No damage.
3-3	Side	5.3	More denting.
3-3	Side	7.5	More denting.
3-3	Side	9.5	More denting.
3-3	Side	11.7	More denting.

NP9-63419 2 March 1953

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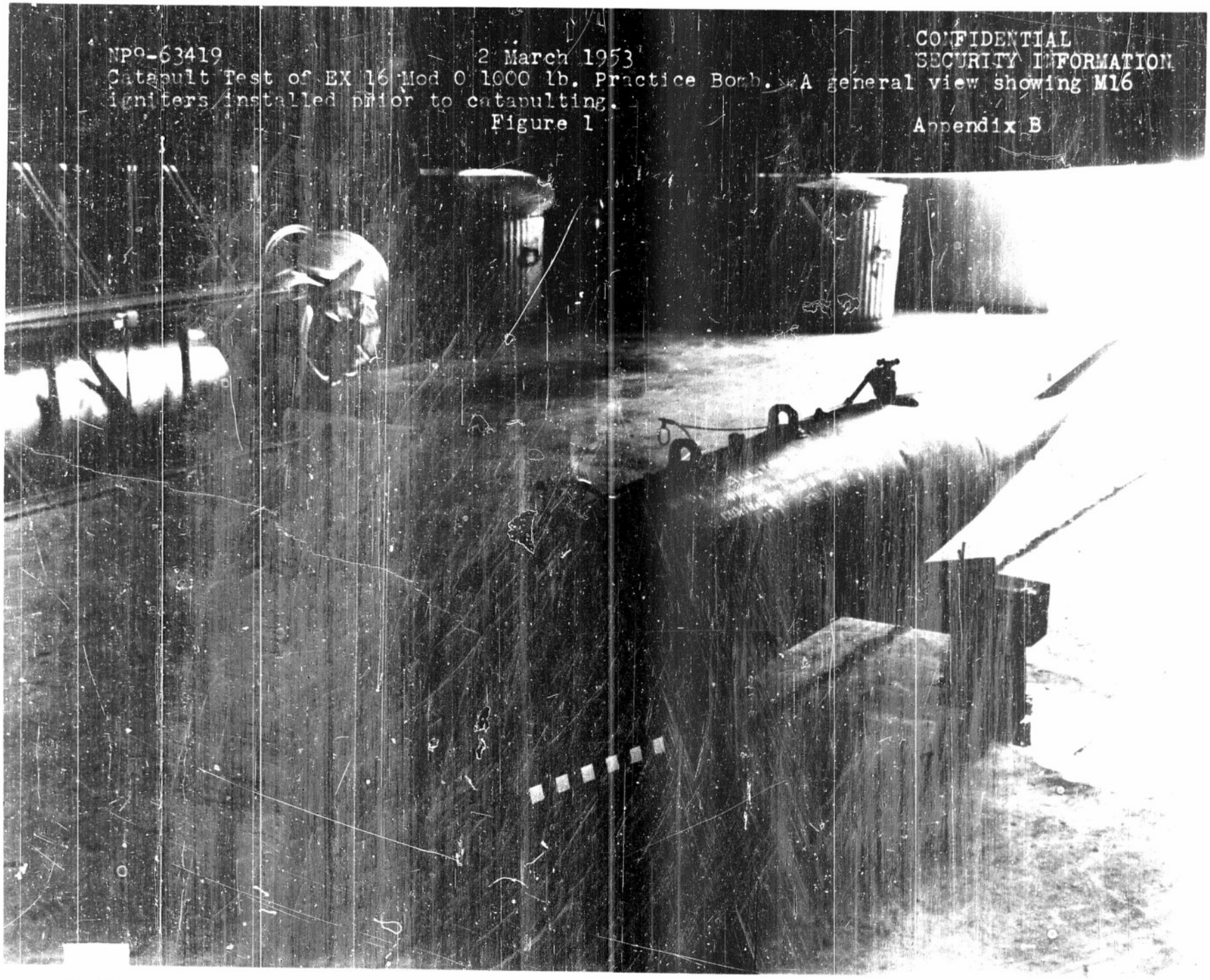
Catapult Test of EX 16 Mod 0 1000 lb. Practice Bomb. A general view showing M16 igniters installed prior to catapulting.

Figure 1

Appendix B



NP9-63420

2 May 1953

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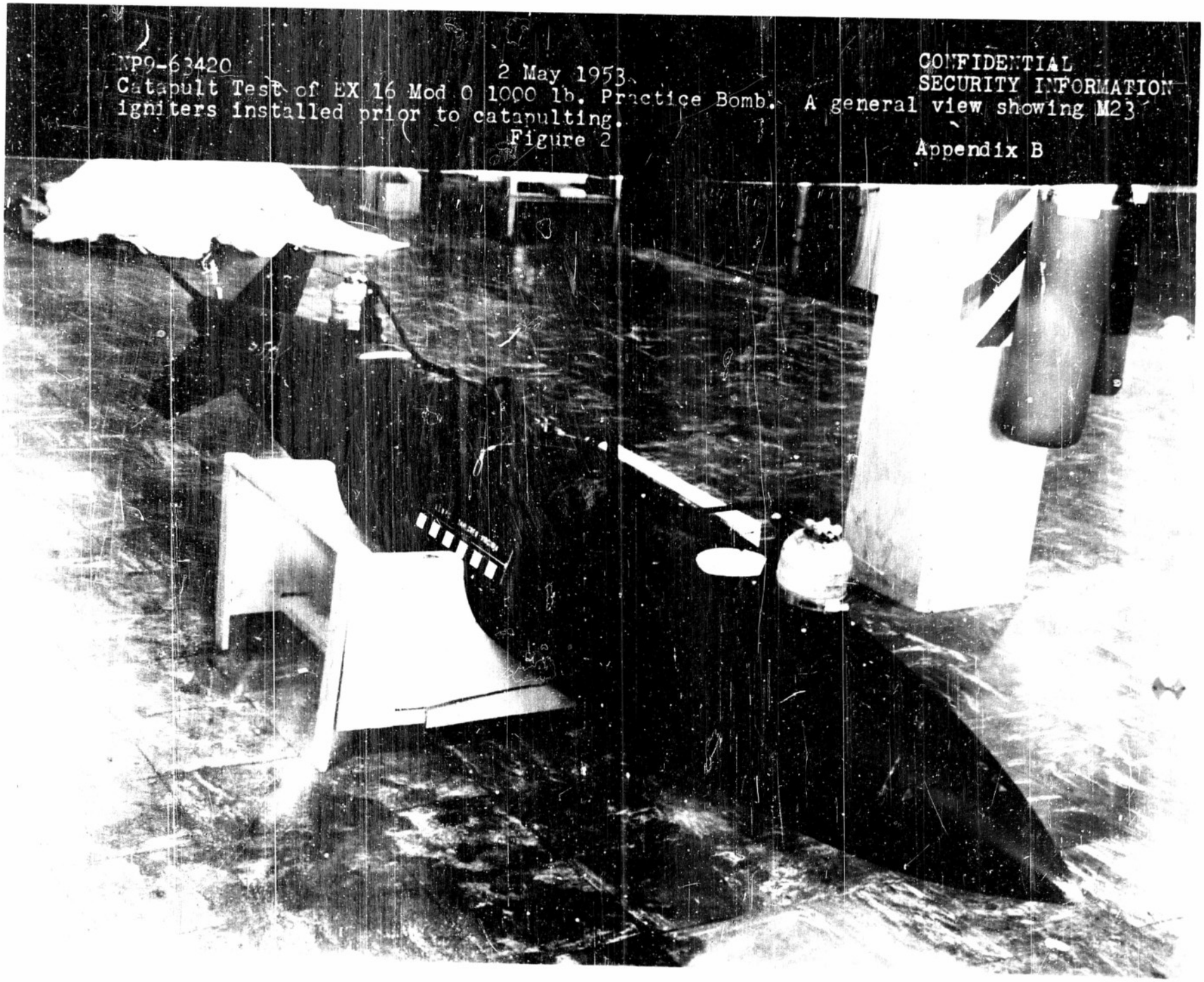
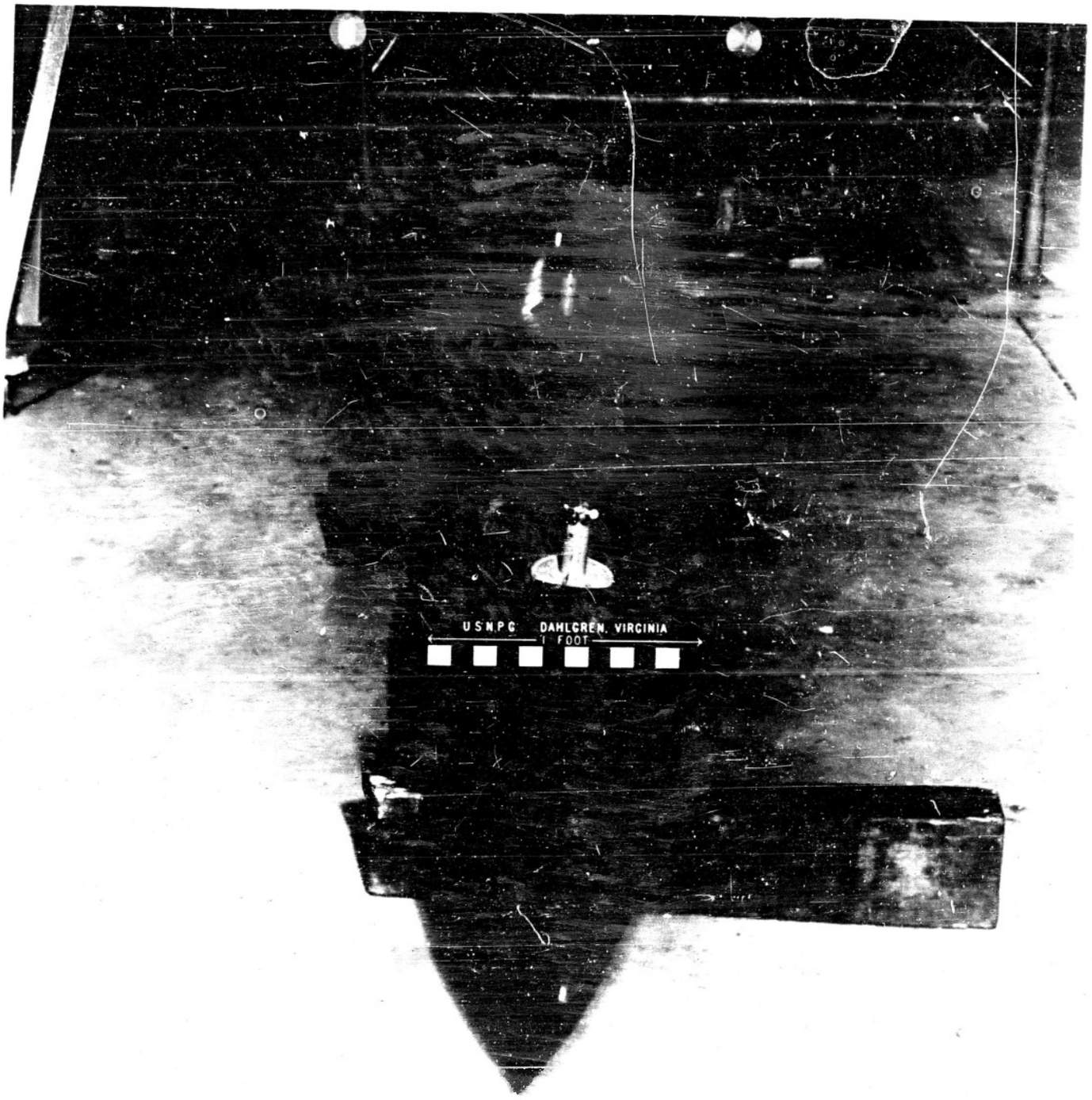
Catapult Test of EX 16 Mod 0 1000 lb. Practice Bomb. A general view showing M23 igniters installed prior to catapulting.

Figure 2

Appendix B

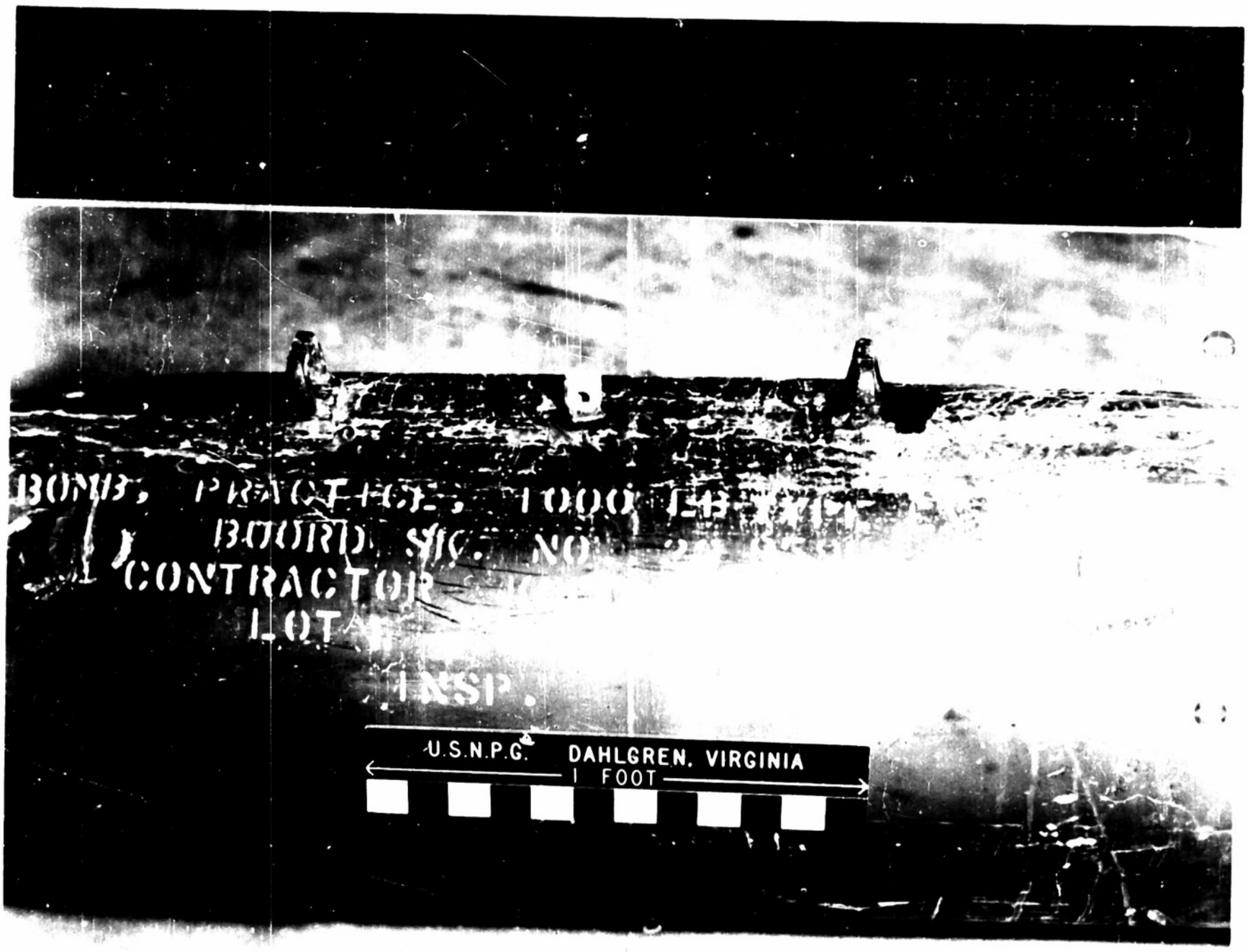




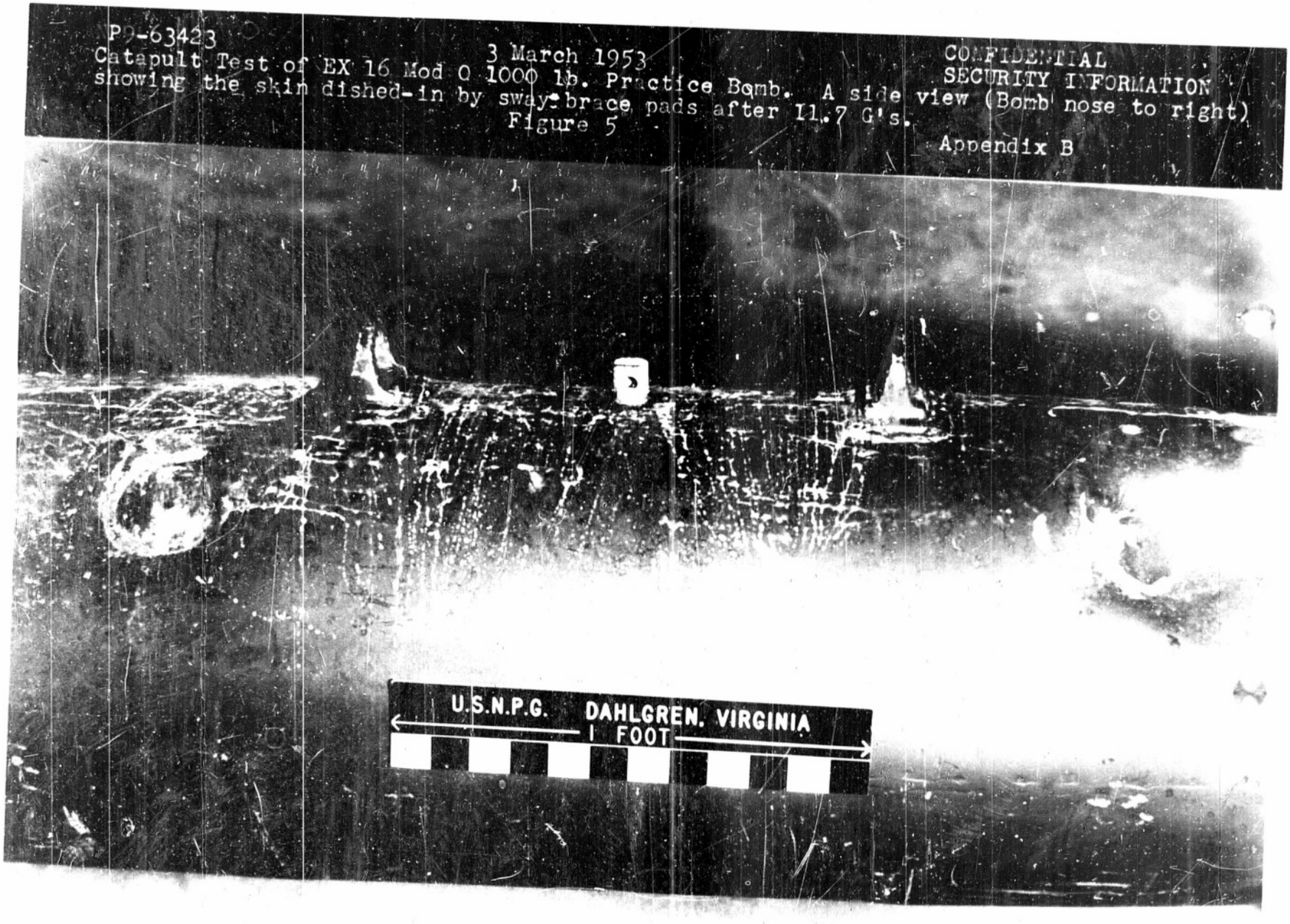
NP9-63421 3 March 1953 CONFIDENTIAL SECURITY INFORMATION

Catapult Test of EX 16 Mod 0 1000 lb. Practice Bomb. A general view showing the skin dished-in by sway brace pads after 11.7 G's.

Figure 3 Appendix B


BOMB, PRACTICE, 1000 LB
BOORD SPC. NO
CONTRACTOR
LOT
INSP.
U.S.N.P.G. DAHLGREN, VIRGINIA
1 FOOT

P9-63423 3 March 1953 CONFIDENTIAL
Catapult Test of EX 16 Mod 0 1000 lb. Practice Bomb. A side view (Bomb nose to right) showing the skin dished-in by sway brace pads after 11.7 G's. SECURITY INFORMATION
Figure 5 Appendix B



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Practice Bomb 1000 pound, Type Ex 16 Mod 0

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